

# **Document made available under the Patent Cooperation Treaty (PCT)**

International application number: PCT/EP05/050680

International filing date: 16 February 2005 (16.02.2005)

Document type: Certified copy of priority document

Document details: Country/Office: US  
Number: 60/545,484  
Filing date: 19 February 2004 (19.02.2004)

Date of receipt at the International Bureau: 06 April 2005 (06.04.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



World Intellectual Property Organization (WIPO) - Geneva, Switzerland  
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse

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APPLICATION NUMBER: 60/545,484  
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13281 US PTO  
21904**Provisional Application Cover Sheet****This is a Request for filing a PROVISIONAL APPLICATION under 37 C.F.R. 1.53(c)**

Customer No. 22,852	Docket Number	01975.6011	Type a plus sign (+) Inside this box → <input checked="" type="checkbox"/>
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US PTO  
60/545484  
22581 021904**TITLE OF THE INVENTION (280 characters max)****IMIDAZOLINE DERIVATIVES HAVING CB<sub>1</sub>-ANTAGONISTIC ACTIVITY****CORRESPONDENCE ADDRESS**

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**ENCLOSED APPLICATION PARTS (check all that apply)**

<input checked="" type="checkbox"/> Specification	Number of Pages 26	<input type="checkbox"/> Small Entity Statement
<input type="checkbox"/> Drawings	Number of Sheets	<input type="checkbox"/> Other Specify

**METHOD OF PAYMENT (check one)**

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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

 No. Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully submitted,

SIGNATURE: *Arthur S. Garrett* Date: February 19, 2004  
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 Additional inventors are being named on separately numbered sheets attached hereto /**PROVISIONAL APPLICATION FILING ONLY**

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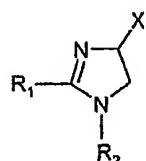
**IMIDAZOLINE DERIVATIVES HAVING CB<sub>1</sub>-ANTAGONISTIC ACTIVITY**

The present invention relates to 1,2,4-tri-substituted imidazoline derivatives, to methods for the preparation of these compounds, to novel intermediates useful 5 for the synthesis of said imidazoline derivatives, to methods for the preparation of these intermediates, to pharmaceutical compositions containing one or more of these imidazoline derivatives as active ingredient, as well as to the use of these pharmaceutical compositions for the treatment of psychiatric and neurological disorders.

10 Multisubstituted imidazoline derivatives are known from WO 03/101954 and WO 03/101969. The compounds described therein, are potent inhibitors of transcription factor NF-KB, making them useful in the treatment of certain types of tumors. Said imidazoline derivatives also have potent activities as 15 anti-inflammatory agents and antibiotics, leading to an additional array of indications in which they are likely to be of therapeutic interest, including inflammatory and infectious diseases. The compounds described in the abovementioned patent applications were not demonstrated to have any affinity for cannabinoid receptors, and therefore unlikely to be of therapeutic 20 value in disorders in which these cannabinoid receptors are involved.

25 The goal of the present invention was to identify imidazoline derivatives with potent activity as cannabinoid-CB<sub>1</sub> receptor modulators, whilst maintaining essentially the physico-chemical properties that make some imidazoline derivatives useful therapeutic agents.

It has now surprisingly been found that potent antagonism or inverse agonism 30 of cannabinoid-CB<sub>1</sub> receptors is present in the novel 4,5-dihydro-1H-imidazole derivatives of the formula (I):



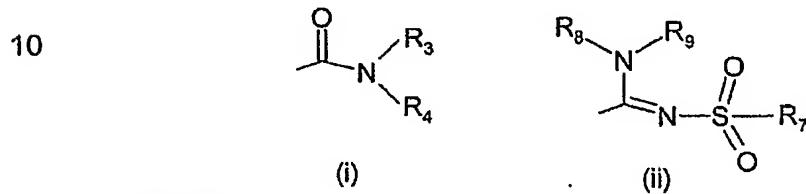
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wherein

- 5

  - R<sub>1</sub> and R<sub>2</sub> independently represent phenyl, thienyl or pyridyl which groups may be substituted with 1, 2 or 3 substituents Y, which can be the same or different, from the group branched or linear C<sub>1-3</sub>-alkyl or C<sub>1-3</sub>-alkoxy, phenyl, hydroxy, chloro, bromo, fluoro, iodo, trifluoromethyl, trifluoromethylthio, trifluoromethoxy, carboxyl, trifluoromethylsulfonyl, cyano, carbamoyl, sulfamoyl and acetyl, or R<sub>1</sub> and/or R<sub>2</sub> represent naphtyl,
  - X represents one of the subgroups (i) or (ii),



wherein

- 15 - R<sub>3</sub> represents a hydrogen atom or a branched or linear C<sub>1-3</sub> alkyl group,  
- R<sub>4</sub> represents a branched or linear C<sub>1-8</sub> alkyl or C<sub>3-8</sub>-cycloalkyl-C<sub>1-2</sub>-alkyl  
group, branched or linear C<sub>1-8</sub> alkoxy, C<sub>3-8</sub> cycloalkyl, C<sub>5-10</sub> bicycloalkyl, C<sub>6-10</sub>  
tricycloalkyl, which groups may contain one or more heteroatoms from the  
group (O, N, S) and which groups may be substituted with a hydroxy group,  
1-3 methyl groups, an ethyl group or 1-3 fluoro atoms, or R<sub>4</sub> represents a  
phenyl, phenoxy, benzyl, phenethyl or phenylpropyl group, optionally  
substituted on their phenyl ring with 1-3 substituents Y, wherein Y has the  
abovementioned meaning, or R<sub>4</sub> represents a pyridyl or thienyl group, or R<sub>4</sub>  
represents a group NR<sub>5</sub>R<sub>6</sub> wherein  
R<sub>5</sub> and R<sub>6</sub> - together with the nitrogen atom to which they are attached -  
form a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group  
having 4 to 10 ring atoms, which heterocyclic group contains one or two  
heteroatoms from the group (O, N, S) and which heterocyclic group may be  
substituted with a branched or linear C<sub>1-3</sub> alkyl, phenyl, hydroxy or  
trifluoromethyl group or a fluoro atom, or  
R<sub>3</sub> and R<sub>4</sub> - together with the nitrogen atom to which they are attached -  
form a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group  
having 4 to 10 ring atoms, which heterocyclic group contains one or two  
heteroatoms from the group (O, N, S) and which heterocyclic group may be

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- substituted with a branched or linear C<sub>1-3</sub> alkyl, phenyl, amino, hydroxy or trifluoromethyl group or a fluoro atom,
- R<sub>7</sub> represents a benzyl, phenyl, thienyl or pyridyl group, which groups may be substituted on their aromatic ring with 1, 2, 3 or 4 substituents Y, wherein Y has the meaning as indicated above, which can be the same or different, or R<sub>7</sub> represents C<sub>1-8</sub> branched or linear alkyl, C<sub>3-8</sub> alkenyl, C<sub>3-10</sub> cycloalkyl, C<sub>5-10</sub> bicycloalkyl, C<sub>6-10</sub> tricycloalkyl or C<sub>6-8</sub> cycloalkenyl or R<sub>7</sub> represents naphthyl or R<sub>7</sub> represents a amino group or R<sub>7</sub> represents a C<sub>1-8</sub> dialkylamino group, a C<sub>1-8</sub> monoalkylamino group or a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring atoms, which heterocyclic group contains 1 or 2 nitrogen atoms and which heterocyclic group may contain 1 heteroatom from the group (O, S) and which heterocyclic group may be substituted with a branched or linear C<sub>1-3</sub> alkyl, phenyl, hydroxy or trifluoromethyl group or a fluoro atom,
  - R<sub>8</sub> represent a hydrogen atom or a methyl group,
  - R<sub>9</sub> represents a hydrogen atom or a methyl, ethyl or methoxy group
- and tautomers, stereoisomers, prodrugs and salts thereof.
- At least one centre of chirality is present (at the C<sub>4</sub> position of the imidazoline moiety) in the compounds of the formula (I). The invention relates to racemates, mixtures of diastereomers as well as the individual stereoisomers of the compounds having formula (I). The invention also relates to the E isomer, Z isomer and E/Z mixtures of compounds having formula (I).
- Pro-drugs, i.e. compounds which when administered to humans by any known route, are metabolised to compounds having formula (I), belong to the invention. In particular this relates to compounds with primary or secondary amino or hydroxy groups. Such compounds can be reacted with organic acids to yield compounds having formula (I) wherein an additional group is present which is easily removed after administration, for instance, but not limited to amidine, enamine, a Mannich base, a hydroxyl-methylene derivative, an O-(acyloxymethylene carbamate) derivative, carbamate, ester, amide or enaminone. A pro-drug is an inactive compound, which when absorbed is

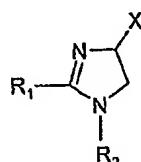
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converted into an active form (Medicinal Chemistry: Principles and Practice, 1994, ISBN 0-85186-494-5, Ed.: F. D. King, p. 215).

The invention particularly relates to compounds having formula (I)

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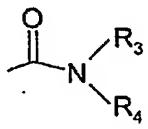


(I)

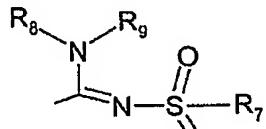
wherein

- R<sub>1</sub> and R<sub>2</sub> independently represent phenyl, which phenyl group may be substituted with 1, 2 or 3 substituents Y, which can be the same or different, from the group branched or linear C<sub>1-3</sub>-alkyl or C<sub>1-3</sub>-alkoxy, phenyl, hydroxy, chloro, bromo, fluoro, iodo, trifluoromethyl, trifluoromethylthio, trifluoromethoxy, carboxyl, trifluoromethylsulfonyl, cyano, carbamoyl, sulfamoyl and acetyl, or R<sub>1</sub> and/or R<sub>2</sub> represent naphthyl, thienyl or pyridyl,
- X represents one of the subgroups (i) or (ii),

15



(i)



(ii)

wherein

20

- R<sub>3</sub> represents a hydrogen atom,
- R<sub>4</sub> represents a branched or linear C<sub>1-8</sub> alkyl, branched or linear C<sub>1-8</sub> alkoxy or C<sub>3-8</sub> cycloalkyl group, which groups may be substituted with a hydroxy group, 1-3 methyl groups, an ethyl group or 1-3 fluoro atoms, or R<sub>4</sub> represents a phenyl, phenoxy, pyridyl or thienyl group, or R<sub>4</sub> represents a group NR<sub>5</sub>R<sub>6</sub> wherein R<sub>5</sub> and R<sub>6</sub> - together with the nitrogen atom to which they are attached - form a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group

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having 4 to 10 ring atoms, which heterocyclic group contains one or two heteroatoms from the group (O, N, S) or

- R<sub>3</sub> and R<sub>4</sub> – together with the nitrogen atom to which they are attached - form a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group
- 5 having 4 to 10 ring atoms, which heterocyclic group contains one or two heteroatoms from the group (O, N, S) and which heterocyclic group may be substituted with a methyl, hydroxy or trifluoromethyl group or a fluoro atom,
- R<sub>7</sub> represents a phenyl group, which phenyl group may be substituted on its aromatic ring with 1, 2, 3 or 4 substituents Y, wherein Y has the
  - 10 meaning as indicated above, which can be the same or different, or R<sub>7</sub> represents C<sub>1-8</sub> branched or linear alkyl, C<sub>3-10</sub> cycloalkyl or C<sub>5-10</sub> bicycloalkyl, or R<sub>7</sub> represents naphtyl or R<sub>7</sub> represents a amino group or R<sub>7</sub> represents a C<sub>1-8</sub> dialkylamino group, a C<sub>1-8</sub> monoalkylamino group or a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring
  - 15 atoms, which heterocyclic group contains 1 or 2 nitrogen atoms and which heterocyclic group may contain 1 heteroatom from the group (O, S) and which heterocyclic group may be substituted with a branched or linear C<sub>1-3</sub> alkyl or hydroxy group,
  - R<sub>8</sub> represents a hydrogen atom,
  - 20 - R<sub>9</sub> represents a hydrogen atom

and tautomers, stereoisomers, prodrugs and salts thereof.

- The compounds of the invention can be brought into forms suitable for
- 25 administration by means of usual processes using auxiliary substances and/or liquid or solid carrier materials.

Due to the potent CB<sub>1</sub> antagonistic activity the compounds according to the invention are suitable for use in the treatment of psychiatric disorders such as

30 psychosis, anxiety, depression, attention deficits, memory disorders, cognitive disorders, appetite disorders, obesity, in particular juvenile obesity and drug induced obesity, addiction, appetence, drug dependence and neurological disorders such as neurodegenerative disorders, dementia, dystonia, muscle spasticity, tremor, epilepsy, multiple sclerosis, traumatic brain injury, stroke,

35 Parkinson's disease, Alzheimer's disease, epilepsy, Huntington's disease,

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Tourette's syndrome, cerebral ischaemia, cerebral apoplexy, craniocerebral trauma, stroke, spinal cord injury, neuroinflammatory disorders, plaque sclerosis, viral encephalitis, demyelinisation related disorders, as well as for the treatment of pain disorders, including neuropathic pain disorders, and other

5 diseases involving cannabinoid neurotransmission, including the treatment of septic shock, glaucoma, cancer, diabetes, emesis, nausea, asthma, respiratory diseases, gastrointestinal disorders, gastric ulcers, diarrhoea, sexual disorders and cardiovascular disorders.

The cannabinoid receptor modulating activity of the compounds of the  
10 invention makes them particularly useful in the treatment of obesity, juvenile obesity and drug induced obesity, when used in combination with lipase inhibitors. Specific examples of compounds which can be used in such combination preparations are (but not restricted to) the synthetic lipase inhibitor orlistat, lipase inhibitors isolated from micro organisms such as  
15 lipstatin (from *Streptomyces toxytricini*), ebelactone B (from *Streptomyces aburaviensis*), synthetic derivatives of these compounds, as well as extracts of plants known to possess lipase inhibitory activity, for instance extracts of *Alpinia officinarum* or compounds isolated from such extracts like 3-methylethergalangin (from *A. officinarum*).

20

## PHARMACOLOGICAL METHODS

25 *In vitro affinity for cannabinoid-CB<sub>1</sub> receptors*

The affinity of the compounds of the invention for cannabinoid CB<sub>1</sub> receptors can be determined using membrane preparations of Chinese hamster ovary (CHO) cells in which the human cannabinoid CB<sub>1</sub> receptor is stably transfected  
30 in conjunction with [<sup>3</sup>H]CP-55,940 as radioligand. After incubation of a freshly prepared cell membrane preparation with the [<sup>3</sup>H]-ligand, with or without addition of compounds of the invention, separation of bound and free ligand is performed by filtration over glassfiber filters. Radioactivity on the filter is measured by liquid scintillation counting.

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***In vitro cannabinoid-CB<sub>1</sub> receptor antagonism***

In vitro CB<sub>1</sub> receptor antagonism can be assessed with the human CB<sub>1</sub> receptor cloned in Chinese hamster ovary (CHO) cells. CHO cells are grown in  
5 a Dulbecco's Modified Eagle's medium (DMEM) culture medium, supplemented with 10% heat-inactivated fetal calf serum. Medium is aspirated and replaced by DMEM, without fetal calf serum, but containing [<sup>3</sup>H]-arachidonic acid and incubated overnight in a cell culture stove (5% CO<sub>2</sub>/95% air; 37 °C; water-saturated atmosphere). During this period [<sup>3</sup>H]-arachidonic acid is incorporated in membrane phospholipids. On the test day, medium is  
10 aspirated and cells are washed three times using 0.5 mL DMEM, containing 0.2% bovine serum albumin (BSA). Stimulation of the CB<sub>1</sub> receptor by WIN 55,212-2 leads to activation of PLA<sub>2</sub> followed by release of [<sup>3</sup>H]-arachidonic acid into the medium. This WIN 55,212-2-induced release is concentration-  
15 dependently antagonized by CB<sub>1</sub> receptor antagonists.

***In vivo cannabinoid-CB<sub>1</sub> receptor antagonism***

In vivo CB<sub>1</sub> antagonism can be assessed with the CP-55,940-induced  
20 hypotension test in rat. Male normotensive rats (225-300 g; Harlan, Horst, The Netherlands) are anaesthetized with pentobarbital (80 mg/kg i.p.). Blood pressure is measured, via a cannula inserted into the left carotid artery, by means of a Spectramed DTX-plus pressure transducer (Spectramed B.V., Bilthoven, The Netherlands). After amplification by a Nihon Kohden Carrier  
25 Amplifier (Type AP-621G; Nihon Kohden B.V., Amsterdam, The Netherlands), the blood pressure signal is registered on a personal computer (Compaq Deskpro 386s), by means of a Po-Ne-Mah data-acquisition program (Po-Ne-Mah Inc., Storrs, USA). Heart rate is derived from the pulsatile pressure signal. All compounds are administered orally as a microsuspension in 1%  
30 methylcellulose 30 minutes before induction of the anesthesia which is 60 minutes prior to administration of the CB<sub>1</sub> receptor agonist CP-55,940. The injection volume is 10 ml/kg. After haemodynamic stabilization the CB<sub>1</sub> receptor agonist CP-55,940 (0.1 mg/kg i.v.) is administered and the hypotensive effect established. (Wagner, J. A.; Jarai, Z.; Batkai, S.; Kunos, G.

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Hemodynamic effects of cannabinoids: coronary and cerebral vasodilation mediated by cannabinoid CB<sub>1</sub> receptors. *Eur.J.Pharmacol.* 2001, 423, 203-10).

Pharmaceutically acceptable salts may be obtained using standard procedures  
5 well known in the art, for example by mixing a compound of the present invention with a suitable acid, for instance an inorganic acid such as hydrochloric acid, or with an organic acid.

#### GENERAL ASPECTS OF SYNTHESSES

10 The synthesis of compounds having formula (I) wherein X represents subgroup (i) is outlined in Scheme 1. Intermediates having general formula (II) can be obtained according to methods known, see for example: I. K. Khanna et al., *J. Med. Chem.* 2000, 43, 3168-3185, I. K. Khanna et al., *J. Med. Chem.* 1997, 40,  
15 1634-1647 or WO 03/027076. Intermediates having general formula (IV) can be obtained according to methods known, see for example: I. K. Khanna et al., *J. Med. Chem.* 2000, 43, 3168-3185.  
20 Carboxamidine derivatives of general formula (II) can be reacted with 2-chloroacrylonitrile (III) to give a 4,5-dihydro-1H-imidazole derivative of general formula (IV). This reaction is preferably carried out in the presence of a base such as N,N-diisopropylethylamine. The obtained derivatives of general formula (IV) can be esterified with an alcohol R<sub>10</sub>-OH to give a 4,5-dihydro-1H-imidazole derivative of general formula (V), wherein R<sub>10</sub> represents a branched or linear C<sub>1-5</sub> alkyl group or a benzyl group. This reaction is preferably carried  
25 out under acidic conditions. A compound of general formula (V) can react with an amine R<sub>3</sub>R<sub>4</sub>NH, preferably in the presence of trimethylaluminum (Me<sub>3</sub>Al) to give a compound of formula (I), wherein X represents subgroup (i) and R<sub>3</sub> and R<sub>4</sub> have the meaning as given above on page 2. Additional information on trimethylaluminum Al(CH<sub>3</sub>)<sub>3</sub> promoted amidation reactions of esters can be  
30 found in: J. I. Levin, E. Turos, S. M. Weinreb, *Synth Commun.* (1982), 12, 989-993.

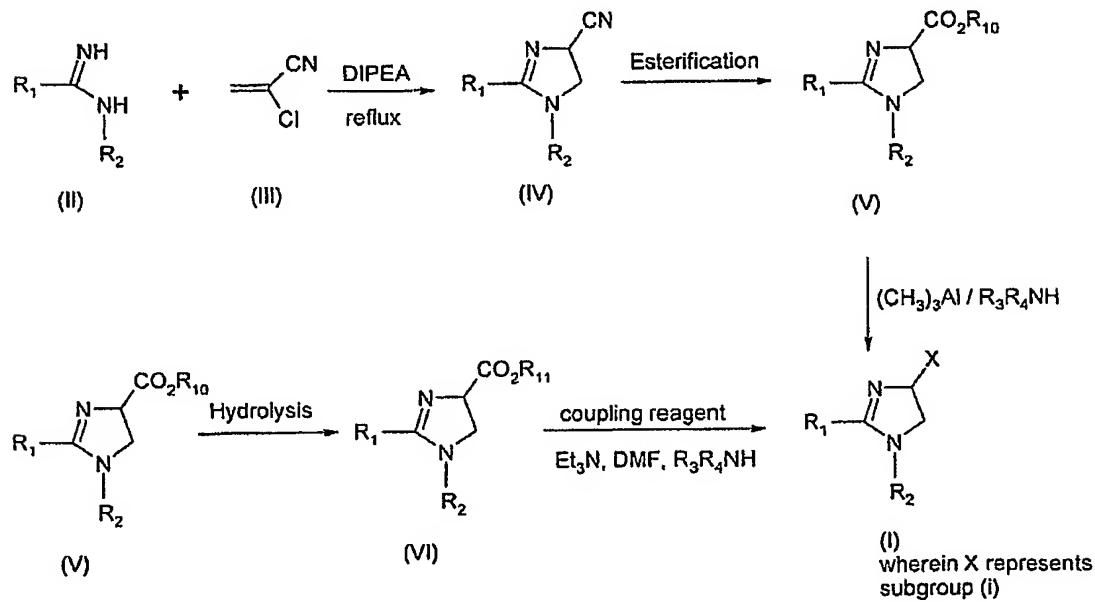
35 Alternatively, a compound of general formula (V) can be hydrolysed to the corresponding carboxylic acid derivative of general formula (VI), wherein R<sub>11</sub> represents H or an earth alkali metal, in particular Li, Na or K. The compound

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of general formula (VI) can be reacted with a chlorinating agent such as thionylchloride to give the corresponding acid chloride. The compound of general formula (VI) can be reacted with an amine  $R_3R_4NH$  to give a compound of formula (I), wherein X represents subgroup (i) and  $R_3$  and  $R_4$  have the meaning as given above on page 2, via activating and coupling methods such as formation of an active ester, or in the presence of a so-called coupling reagent, such as for example, DCC, HBTU, BOP (benzotriazol-1-yloxytris(dimethylamino)phosphonium hexafluorophosphate) and the like. Additional information on activating and coupling methods of amines to carboxylic acids can be found in:

- a) M. Bodanszky and A. Bodanszky: *The Practice of Peptide Synthesis*, Springer-Verlag, New York, 1994; ISBN: 0-387-57505-7;
- b) K. Akaji et al., *Tetrahedron Lett.* (1994), 35, 3315-3318);
- c) F. Albericio et al., *Tetrahedron Lett.* (1997), 38, 4853-4856).

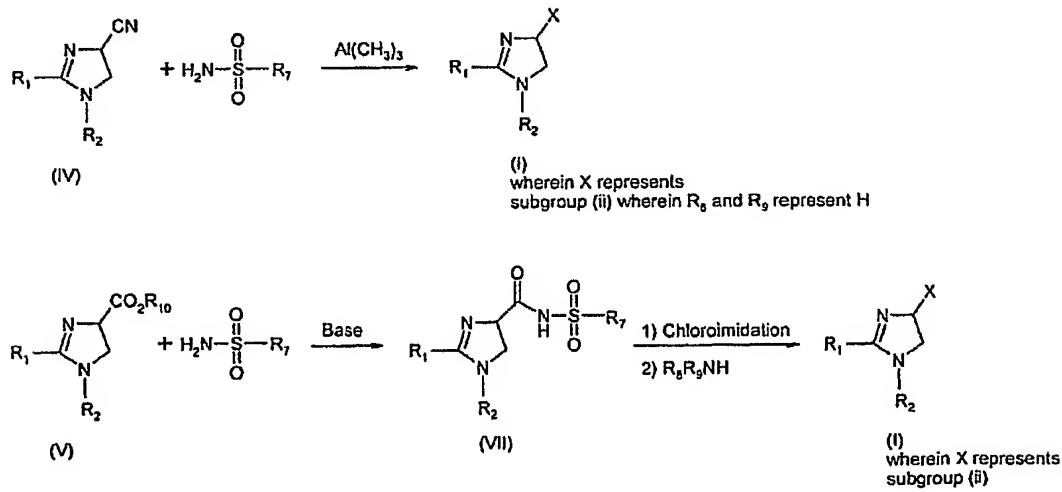


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The synthesis of compounds having formula (I) wherein X represents subgroup (ii) is outlined in Scheme 2.

An intermediate of general formula  $R_7SO_2NH_2$  is either commercially available or can be prepared via standard synthetic methodology, for example from the corresponding compound  $R_7SO_2Cl$  (see for example; McManus et al., J. Med. Chem. 1965, 8, 766). A compound of general formula (IV) can be reacted with a compound of general formula  $R_7SO_2NH_2$  in the presence of a Lewis acid such as for example  $AlMe_3$  in an inert organic solvent such as benzene to give a compound of general formula (I) wherein X represents subgroup (ii) and  $R_1$ ,  $R_2$  and  $R_7$  have the meaning as given above on the pages 1-3 and wherein  $R_8$  and  $R_9$  represent a hydrogen atom. A compound of general formula (V) may be reacted with a compound of general formula  $R_7SO_2NH_2$  to give a compound of general formula (VII). This reaction is preferably carried out in the presence of a strong non-nucleophilic base. A compound of general formula (VII) may be reacted with a chlorinating reagent in a chloroimidation reaction and subsequently treated with an amine  $R_8R_9NH$  to give a compound of formula (I), wherein X represents subgroup (ii).



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Scheme 2

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The selection of the particular synthetic method depends on factors such as the compatibility of functional groups with the reagents used, the possibility to use protecting groups, catalysts, activating and coupling reagents and the ultimate structural features present in the final compound being prepared.

5

According to these procedures the following compounds can be prepared. They are intended to further illustrate the invention in more detail, and therefore are not deemed to restrict the scope of the invention in any way.

## 10 SYNTHESES OF SPECIFIC EXAMPLES

### Examples 1 - 2

Part A: A magnetically stirred mixture of N-(4-chlorophenyl)-2,4-dichlorobenzene carboxamidine (10.0 gram, 0.033 mol), 2-chloroacrylonitrile (5.7 gram, 0.065 mol) and N,N-diisopropylethylamine (DIPEA) (12.5 ml, 0.069 mol) in tetrahydrofuran (150 ml) is heated at reflux temperature for 40 hours (N<sub>2</sub> atmosphere). After cooling to room temperature the mixture is concentrated in vacuo. The residue is dissolved in a mixture of dichloromethane and water (200 ml/200 ml). The dichloromethane layer is collected, dried over MgSO<sub>4</sub>, filtered and concentrated in vacuo. The residue is recrystallised from ethanol/water to give 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-4,5-dihydro-1H-imidazole-4-carbonitrile (11.23 gram, 97 % yield). <sup>1</sup>H-NMR (400 MHz, CDCl<sub>3</sub>): δ 4.28 (dd, J = 10 and 8 Hz, 1H), 4.36 (t, J = 10 Hz, 1H), 5.07 (dd, J = 10 and 8 Hz, 1H), 6.68 (br d, J = 8 Hz, 2H), 7.16 (br d, J = 8 Hz, 2H), 7.32-7.36 (m, 2H), 7.45 (d, J = 8 Hz, 1H).

Part B: Acetyl chloride (17.76 ml, 0.25 mol) is slowly added to ethanol (1 l) to give solution A. 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-4,5-dihydro-1H-imidazole-4-carbonitrile (17.52 gram, 0.05 mol) is added in one portion to solution A. After cooling to room temperature the mixture is stirred for another 40 hours and concentrated in vacuo. The residue is dissolved in dichloromethane and washed (3x) with aqueous (5 %) NaHCO<sub>3</sub>. The dichloromethane layer is separated, dried over MgSO<sub>4</sub>, filtered and concentrated in vacuo to give ethyl 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-

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4,5-dihydro-1H-imidazole-4-carboxylate (18.0 gram, 90 % yield) as a brown oil that slowly solidifies on standing.  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ ):  $\delta$  1.34 (t,  $J = 7$  Hz, 3H), 4.15 (dd,  $J = 10$  and 8 Hz, 1H), 4.22-4.41 (m, 3H), 4.91 (dd,  $J = 10$  and 8 Hz, 1H), 6.66 (br d,  $J = 8$  Hz, 2H), 7.11 (br d,  $J = 8$  Hz, 2H), 7.30 (dd,  $J = 8$  and 2 Hz, 1H), 7.33 (d,  $J = 2$  Hz, 1H), 7.46 (dd,  $J = 8$  Hz, 1H).

Part C: To a magnetically stirred solution of exo-2-aminobicyclo[2.2.1]heptane (0.67 ml, 0.009 mol) in anhydrous dichloromethane (10 ml) is added trimethylaluminum (5.4 ml of a 2N solution in hexane, 0.0108 mol) and the 10 resulting solution is stirred for 20 minutes at room temperature. A solution of ethyl 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-4,5-dihydro-1H-imidazole-4-carboxylate (2.385 g, 0.006 mol) in anhydrous dichloromethane (10 ml) is slowly added and the resulting mixture is reacted at 40 °C for 40 hours ( $\text{N}_2$  atmosphere). After cooling to room temperature the mixture is quenched with 15 aqueous (5 %)  $\text{NaHCO}_3$  and extracted with dichloromethane. The dichloromethane layer is separated, dried over  $\text{MgSO}_4$ , filtered and concentrated in vacuo to give a crude yellow syrup (2.58 gram) which is further purified with flash chromatography (silica gel, ethyl acetate/petroleum ether = 8/2 (v/v)) to give the faster moving 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-N- 20 (exo-2-bicyclo[2.2.1]heptyl)-4,5-dihydro-1H-imidazole-4-carboxamide (diastereomer A) (0.70 gram, 25 % yield) and the slower moving 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-N-(exo-2-bicyclo[2.2.1]heptyl)-4,5-dihydro-1H-imidazole-4-carboxamide (diastereomer B) (0.69 gram, 25 % yield).

25

Diastereomer A:  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ ):  $\delta$  1.10-1.58 (m, 7H), 1.76-1.84 (m, 1H), 2.26-2.30 (m, 2H), 3.74-3.82 (m, 1H), 4.27 (d,  $J \sim 10$  Hz, 2H), 4.78 (t,  $J \sim 10$  Hz, 1H), 6.65 (br d,  $J = 8$  Hz, 2H), 6.70-6.78 (m, 1H), 7.12 (br d,  $J = 8$  Hz, 2H), 7.29 (br s, 2H), 7.40 (br s, 1H).

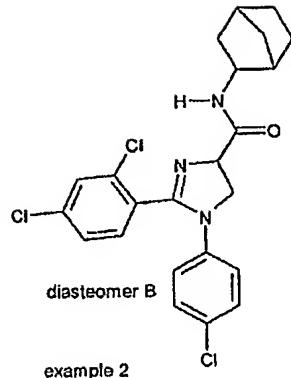
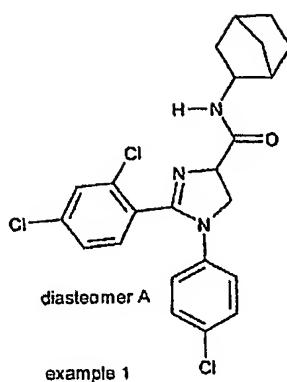
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Diastereomer B:  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ ):  $\delta$  1.10-1.56 (m, 7H), 1.78-1.85 (m, 1H), 2.17-2.20 (m, 1H), 2.26-2.30 (m, 1H), 3.76-3.82 (m, 1H), 4.25-4.30 (m, 2H), 4.78 (dd,  $J = 10$  and 8 Hz, 1H), 6.66 (br d,  $J = 8$  Hz, 2H), 6.80 (br d,  $J \sim 7$  Hz, 1H), 7.11 (br d,  $J = 8$  Hz, 2H), 7.30 (br s, 2H), 7.41 (br s, 1H).

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### **Examples 3 and 4**

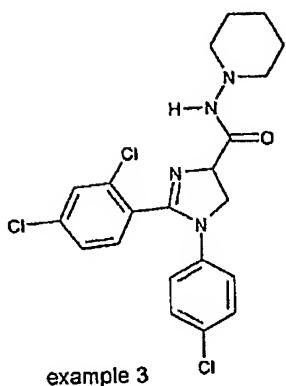
10 Part A: A mixture of ethyl 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-4,5-dihydro-1H-imidazole-4-carboxylate (3.97 g, 0.01 mol) in methanol/water is reacted with LiOH (1.3 gram, 0.054 mol) at room temperature for 16 hours. The resulting mixture is concentrated in vacuo to give crude lithium 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-4,5-dihydro-1H-imidazole-4-carboxylate (4.7 gram).

15 Part B: A mixture of the crude lithium 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-4,5-dihydro-1H-imidazole-4-carboxylate (1.0 gram, ~ 0.0027 mol), benzotriazol-1-yloxytris(dimethylamino)phosphonium hexafluorophosphate (BOP) (1.2 gram, 0.0027 mol), 1-aminopiperidine (0.3 gram, 0.003 mol) and triethylamine (1 ml) in DMF (30 ml) is stirred at room temperature for 16 hours. After concentration in vacuo, water is added and the resulting mixture is extracted (2x) with dichloromethane. The dichloromethane layers are collected, dried over MgSO<sub>4</sub>, filtered and concentrated in vacuo to give a residue that is further purified by flash chromatography (silicagel, dichloromethane/methanol = 95/5 (v/v)) to give 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-N-(piperidin-1-yl)-4,5-dihydro-1H-imidazole-4-carboxamide (380 mg, 31 % yield). Melting point: 113-116 °C. <sup>1</sup>H-NMR (200 MHz, CDCl<sub>3</sub>): δ 1.33-1.48 (m, 2H), 1.60-1.80 (m, 4H), 2.68-2.82 (m, 4H), 4.28-4.35 (m, 2H), 4.84 (dd, J = 11 and 9 Hz, 1H),

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6.65 (br d,  $J = 8$  Hz, 2H), 7.11 (br d,  $J = 8$  Hz, 2H), 7.23-7.33 (m, 2H), 7.41 (d,  $J = 2$  Hz, 1H), 7.57 (br s, 1H).



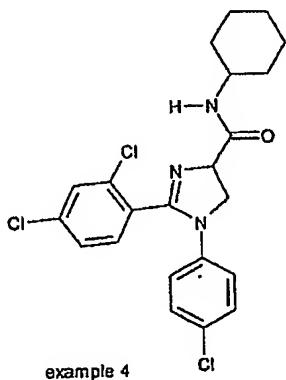
example 3

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In an analogous manner example 4 was prepared:

- 10 **Example 4:** 1-(4-Chlorophenyl)-2-(2,4-dichlorophenyl)-N-cyclohexyl-4,5-dihydro-1H-imidazole-4-carboxamide. Melting point: 127-129 °C.  $^1\text{H-NMR}$  (200 MHz,  $\text{CDCl}_3$ ):  $\delta$  1.04-2.03 (m, 10H), 3.73-3.92 (m, 1H), 4.23-4.33 (m, 2H), 4.81 (t,  $J \sim 10$  Hz, 1H), 6.66 (br d,  $J = 8$  Hz, 2H), 6.79 (br d,  $J \sim 7$  Hz, 1H), 7.12 (br d,  $J = 8$  Hz, 2H), 7.25-7.32 (m, 2H), 7.41 (br s, 1H).

15



example 4

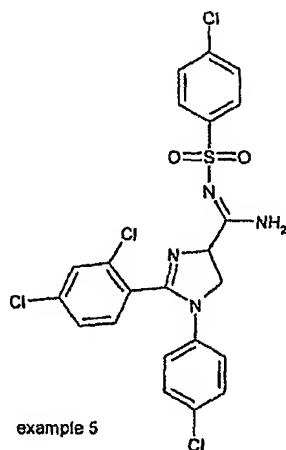
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**Examples 5 – 8**

**Part A:** To a suspension of 4-chlorobenzenesulfonamide (0.45 gram, 0.00236 mol) in benzene (5 ml) is dropwise added trimethylaluminum (1.2 ml of a 2N solution in toluene, 0.0024 mol) to give a clear solution which is stirred at room temperature for 1 hour. 1-(4-Chlorophenyl)-2-(2,4-dichlorophenyl)-4,5-dihydro-1H-imidazole-4-carbonitrile (0.55 gram, 0.00157 mol) is added and the resulting mixture is heated at 90 °C for 16 hours. After cooling to room temperature a mixture of methanol/water (8/2 (v/v)) is slowly added, the solids are removed by filtration and washed with chloroform (50 ml). The filtrate is concentrated in vacuo. The residue is triturated with n-pentane and twice recrystallised from methanol to give 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-N-[(4-chlorophenyl)sulfonyl]-4,5-dihydro-1H-imidazole-4-carboxamidine (0.435 gram, 51 % yield). Melting point: 165-166 °C.  $^1\text{H-NMR}$  (200 MHz,  $\text{CDCl}_3$ ): δ 4.11-4.35 (m, 2H), 4.94 (dd,  $J = 12$  and 10 Hz, 1H), 6.63 (br d,  $J = 8$  Hz, 2H), 7.12 (br d,  $J = 8$  Hz, 2H), 7.22-7.52 (m, 6H), 7.90 (br d,  $J = 8$  Hz, 2H), 8.10-8.20 (m, 1H).

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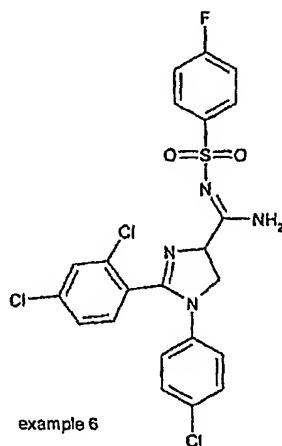


In an analogous manner the compounds having formula (I) listed below have been prepared:

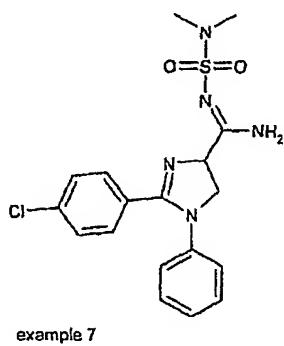
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**Example 6:** 1-(4-Chlorophenyl)-2-(2,4-dichlorophenyl)-N-[(4-fluorophenyl)sulfonyl]-4,5-dihydro-1H-imidazole-4-carboxamidine. Melting point: 172-175 °C.  
<sup>1</sup>H-NMR (200 MHz, CDCl<sub>3</sub>): δ 4.12-4.35 (m, 2H), 4.93 (dd, J = 12 and 10 Hz, 1H), 6.63 (br d, J = 8 Hz, 2H), 7.08-7.43 (m, 8H), 7.90-8.02 (m, 2H), 8.10-8.20  
5 (m, 1H).



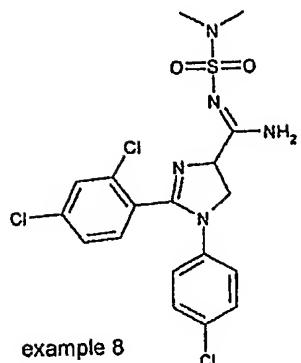
**Example 7:** 2-(4-Chlorophenyl)-N-(dimethylaminosulfonyl)-1-phenyl-4,5-dihydro-1H-imidazole-4-carboxamidine. Melting point: 136-139 °C. <sup>1</sup>H-NMR  
10 (200 MHz, CDCl<sub>3</sub>): δ 2.79 (s, 6H), 4.20-4.40 (m, 2H), 4.97 (t, J ~ 10 Hz, 1H), 6.83 (br d, J = 8 Hz, 2H), 7.05-7.50 (m, 8H), 7.80-7.90 (m, 1H).



15 **Example 8:** 1-(4-chlorophenyl)-2-(2,4-dichlorophenyl)-N-(dimethylaminosulfonyl)-4,5-dihydro-1H-imidazole-4-carboxamidine. Melting point: 146-147 °C.

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## FORMULATIONS OF COMPOUNDS AS USED IN ANIMAL STUDIES

### 5 Formulation of example 1:

For oral (*p.o.*) administration: to the desired quantity (0.5-15 mg) of the compound given above as 'Example 1' in a glass tube, some glass beads were added and the substance was milled by vortexing for 2 minutes. After addition of 1 ml of a solution of 1% methylcellulose in water, the compound was suspended by vortexing for 10 minutes. For concentrations up and above 1 mg/ml remaining particles in the suspension were further suspended by using an ultrasonic bath.

## PHARMACOLOGICAL TESTRESULTS

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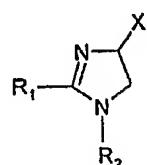
Example number	Human cannabinoid-CB <sub>1</sub> receptor
	<i>In vitro</i> affinity: pK <sub>i</sub> value
Example 1	7.3
Example 2	7.0
Example 4	7.1
Example 8	7.4

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## CLAIMS

## 1. Compounds of the general formula (I)

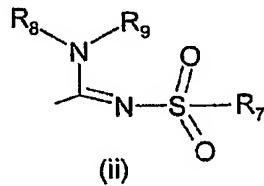
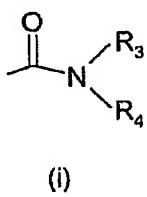


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wherein

- R<sub>1</sub> and R<sub>2</sub> independently represent phenyl, thiienyl or pyridyl which groups may be substituted with 1, 2 or 3 substituents Y, which can be the same or different, from the group branched or linear C<sub>1-3</sub>-alkyl or C<sub>1-3</sub>-alkoxy, phenyl, hydroxy, chloro, bromo, fluoro, iodo, trifluoromethyl, trifluoromethylthio, trifluoromethoxy, carboxyl, trifluoromethylsulfonyl, cyano, carbamoyl, sulfamoyl and acetyl, or R<sub>1</sub> and/or R<sub>2</sub> represent naphtyl,
- X represents one of the subgroups (i) or (ii),

15



wherein

- R<sub>3</sub> represents a hydrogen atom or a branched or linear C<sub>1-3</sub> alkyl group,
- R<sub>4</sub> represents a branched or linear C<sub>1-8</sub> alkyl or C<sub>3-6</sub>-cycloalkyl-C<sub>1-2</sub>-alkyl group, branched or linear C<sub>1-8</sub> alkoxy, C<sub>3-8</sub> cycloalkyl, C<sub>5-10</sub> bicycloalkyl, C<sub>6-10</sub> tricycloalkyl, which groups may contain one or more heteroatoms from the group (O, N, S) and which groups may be substituted with a hydroxy group, 1-3 methyl groups, an ethyl group or 1-3 fluoro atoms, or R<sub>4</sub> represents a phenoxy, benzyl, phenethyl or phenylpropyl group, optionally substituted on their phenyl ring with 1-3 substituents Y, wherein Y has the abovementioned meaning, or R<sub>4</sub> represents a pyridyl or thiienyl group, or R<sub>4</sub> represents a group NR<sub>5</sub>R<sub>6</sub> wherein

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- R<sub>5</sub> and R<sub>6</sub> - together with the nitrogen atom to which they are attached - form a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring atoms, which heterocyclic group contains one or two heteroatoms from the group (O, N, S) and which heterocyclic group may be substituted with a branched or linear C<sub>1-3</sub> alkyl, phenyl, hydroxy or trifluoromethyl group or a fluoro atom,
- R<sub>3</sub> and R<sub>4</sub> – together with the nitrogen atom to which they are attached - form a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring atoms, which heterocyclic group contains one or two heteroatoms from the group (O, N, S) and which heterocyclic group may be substituted with a branched or linear C<sub>1-3</sub> alkyl, phenyl, amino, hydroxy or trifluoromethyl group or a fluoro atom,
- R<sub>7</sub> represents a benzyl, phenyl, thienyl or pyridyl group, which groups may be substituted on their aromatic ring with 1; 2, 3 or 4 substituents Y, wherein Y has the meaning as indicated above, which can be the same or different, or R<sub>7</sub> represents C<sub>1-8</sub> branched or linear alkyl, C<sub>3-8</sub> alkenyl, C<sub>3-10</sub> cycloalkyl, C<sub>5-10</sub> bicycloalkyl, C<sub>6-10</sub> tricycloalkyl or C<sub>5-8</sub> cycloalkenyl or R<sub>7</sub> represents naphtyl or R<sub>7</sub> represents a amino group or R<sub>7</sub> represents a C<sub>1-8</sub> dialkylamino group, a C<sub>1-8</sub> monoalkylamino group or a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring atoms, which heterocyclic group contains 1 or 2 nitrogen atoms and which heterocyclic group may contain 1 heteroatom from the group (O, S) and which heterocyclic group may be substituted with a branched or linear C<sub>1-3</sub> alkyl, phenyl, hydroxy or trifluoromethyl group or a fluoro atom,
- R<sub>8</sub> represent a hydrogen atom or a methyl group,
- R<sub>9</sub> represents a hydrogen atom or a methyl, ethyl or methoxy group,

and tautomers, stereoisomers, prodrugs and salts thereof

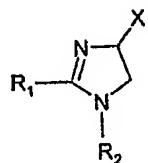
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## 2. Compounds of the general formula (I)



(1)

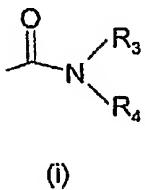
wherein

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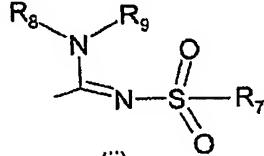
- R<sub>1</sub> and R<sub>2</sub> independently represent phenyl, which phenyl group may be substituted with 1, 2 or 3 substituents Y, which can be the same or different, from the group branched or linear C<sub>1-3</sub>-alkyl or C<sub>1-3</sub>-alkoxy, phenyl, hydroxy, chloro, bromo, fluoro, iodo, trifluoromethyl, trifluoromethylthio, trifluoromethoxy, carboxyl, trifluoromethylsulfonyl, cyano, carbamoyl, sulfamoyl and acetyl, or R<sub>1</sub> and/or R<sub>2</sub> represent naphthyl, thienyl or pyridyl,

– X represents one of the subgroups (i) or (ii),

15



(i)



(ii)

wherein

- R<sub>3</sub> represents a hydrogen atom,

20 - R<sub>4</sub> represents a branched or linear C<sub>1-8</sub> alkyl, branched or linear C<sub>1-8</sub> alkoxy or C<sub>3-8</sub> cycloalkyl group, which groups may be substituted with a hydroxy group, 1-3 methyl groups, an ethyl group or 1-3 fluoro atoms, or R<sub>4</sub> represents a phenoxy, pyridyl or thienyl group, or R<sub>4</sub> represents a group NR<sub>5</sub>R<sub>6</sub> wherein

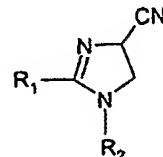
25 R<sub>5</sub> and R<sub>6</sub> - together with the nitrogen atom to which they are attached - form a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring atoms, which heterocyclic group contains one or two heteroatoms from the group (O, N, S) or

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- R<sub>3</sub> and R<sub>4</sub> – together with the nitrogen atom to which they are attached - form a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring atoms, which heterocyclic group contains one or two heteroatoms from the group (O, N, S) and which heterocyclic group may be substituted with a methyl, hydroxy or trifluoromethyl group or a fluoro atom,
- 5           – R<sub>7</sub> represents a phenyl group, which phenyl group may be substituted on its aromatic ring with 1, 2, 3 or 4 substituents Y, wherein Y has the meaning as indicated above, which can be the same or different, or R<sub>7</sub> represents C<sub>1-8</sub> branched or linear alkyl, C<sub>3-10</sub> cycloalkyl or C<sub>5-10</sub> bicycloalkyl,
- 10           – R<sub>7</sub> represents naphtyl or R<sub>7</sub> represents a amino group or R<sub>7</sub> represents a C<sub>1-8</sub> dialkylamino group, a C<sub>1-8</sub> monoalkylamino group or a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring atoms, which heterocyclic group contains 1 or 2 nitrogen atoms and which heterocyclic group may contain 1 heteroatom from the group (O, S) and
- 15           – which heterocyclic group may be substituted with a branched or linear C<sub>1-3</sub> alkyl or hydroxy group,
- R<sub>8</sub> represent a hydrogen atom,
- R<sub>9</sub> represents a hydrogen atom
- 20           and tautomers, stereoisomers, prodrugs and salts thereof.
3. Pharmaceutical compositions containing a pharmacologically active amount of at least one compound as claimed in claim 1 or claim 2, or a salt thereof, as an active component.
- 25           4. A compound as claimed in claim 1 or claim 2, or a salt thereof, for use in medicine
5. Compounds of the general formula (IV)

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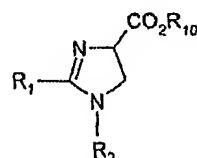
(IV)

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wherein R<sub>1</sub> and R<sub>2</sub> have the meanings given in claim 1, such compounds being useful in the synthesis of compounds of the general formula (I).

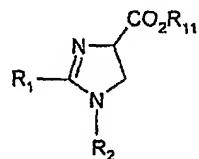
5 6. Compounds of the general formula (V)



(V)

10 wherein R<sub>1</sub> and R<sub>2</sub> have the meanings given in claim 1 and R<sub>10</sub> represents a branched or linear C<sub>1-5</sub> alkyl group or a benzyl group, such compounds being useful in the synthesis of compounds of the general formula (I).

7. Compounds of the general formula (VI)



(VI)

15 wherein R<sub>1</sub> and R<sub>2</sub> have the meanings given in claim 1 and R<sub>11</sub> represents H or an earth alkali metal, such compounds being useful in the synthesis of compounds of the general formula (I).

- 20 8. Use of a compound as claimed in claim 1 or claim 2 for the preparation of a pharmaceutical composition for the treatment of psychosis, anxiety, depression, attention deficits, memory disorders, cognitive disorders, appetite disorders, obesity, in particular juvenile obesity and drug induced obesity, addiction, appetence, drug dependence and neurological disorders such as neurodegenerative disorders, dementia, dystonia, muscle spasticity, tremor, epilepsy, multiple sclerosis, traumatic brain injury, stroke,
- 25

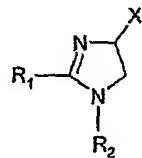
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Parkinson's disease, Alzheimer's disease, epilepsy, Huntington's disease, Tourette's syndrome, cerebral ischaemia, cerebral apoplexy, craniocerebral trauma, stroke, spinal cord injury, neuroinflammatory disorders, plaque sclerosis, viral encephalitis, demyelinisation related disorders, as well as for the treatment of pain disorders, including neuropathic pain disorders, and other diseases involving cannabinoid neurotransmission, including the treatment of septic shock, glaucoma, cancer, diabetes, emesis, nausea, asthma, respiratory diseases, gastrointestinal disorders, gastric ulcers, diarrhoea, sexual disorders and cardiovascular disorders.

9. A method of treating psychosis, anxiety, depression, attention deficits, memory disorders, cognitive disorders, appetite disorders, obesity, addiction, drug dependence and neurological disorders such as dementia, dystonia, muscle spasticity, tremor, epilepsy, multiple sclerosis, traumatic brain injury, stroke, Parkinson's disease, Alzheimer's disease, epilepsy, Huntington's disease, Tourette's syndrome, cerebral ischaemia, cerebral apoplexy, craniocerebral trauma as well as for the treatment of neuropathic pain disorders and other diseases involving cannabinoid neurotransmission, including glaucoma, cancer, emesis, nausea, asthma, respiratory diseases, gastrointestinal disorders, gastric ulcers, diarrhoea, sexual disorders and cardiovascular disorders,

characterized in that a compound of formula (I) is used



25

(I)

wherein

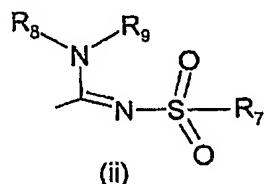
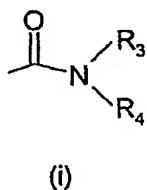
- R<sub>1</sub> and R<sub>2</sub> independently represent phenyl, thienyl or pyridyl which groups may be substituted with 1, 2 or 3 substituents Y, which can be the same or different, from the group C<sub>1-3</sub>-alkyl or C<sub>1-3</sub>-alkoxy, phenyl, hydroxy, chloro, bromo, fluoro, iodo, trifluoromethyl, trifluoromethylthio, trifluoromethoxy,

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- methylsulfonyl, carboxyl, trifluoromethylsulfonyl, cyano, carbamoyl, sulfamoyl and acetyl, or R<sub>1</sub> and/or R<sub>2</sub> represent naphthyl,  
 – X represents one of the subgroups (i) or (ii),

5



wherein

- R<sub>3</sub> represents a hydrogen atom or a branched or linear C<sub>1-3</sub> alkyl group,
- 10 - R<sub>4</sub> represents a branched or linear C<sub>1-8</sub> alkyl or C<sub>3-8</sub>-cycloalkyl-C<sub>1-2</sub>-alkyl group, branched or linear C<sub>1-8</sub> alkoxy, C<sub>3-8</sub> cycloalkyl, C<sub>5-10</sub> bicycloalkyl, C<sub>6-10</sub> tricycloalkyl, which groups may contain one or more heteroatoms from the group (O, N, S) and which groups may be substituted with a hydroxy group, 1-3 methyl groups, an ethyl group or 1-3 fluoro atoms, or R<sub>4</sub> represents a phenyl, phenoxy, benzyl, phenethyl or phenylpropyl group, optionally substituted on their phenyl ring with 1-3 substituents Y, wherein Y has the abovementioned meaning, or R<sub>4</sub> represents a pyridyl or thiienyl group, or R<sub>4</sub> represents a group NR<sub>5</sub>R<sub>6</sub> wherein
- 15 R<sub>5</sub> and R<sub>6</sub> - together with the nitrogen atom to which they are attached - form a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring atoms, which heterocyclic group contains one or more heteroatoms from the group (O, N, S) and which heterocyclic group may be substituted with a branched or linear C<sub>1-3</sub> alkyl, phenyl, hydroxy or trifluoromethyl group or a fluoro atom, or
- 20 R<sub>3</sub> and R<sub>4</sub> – together with the nitrogen atom to which they are attached - form a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring atoms, which heterocyclic group contains one or more heteroatoms from the group (O, N, S) and which heterocyclic group may be substituted with a branched or linear C<sub>1-3</sub> alkyl, phenyl, amino, hydroxy or trifluoromethyl group or a fluoro atom,
- 25 R<sub>3</sub> and R<sub>4</sub> – together with the nitrogen atom to which they are attached - form a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring atoms, which heterocyclic group contains one or more heteroatoms from the group (O, N, S) and which heterocyclic group may be substituted with a branched or linear C<sub>1-3</sub> alkyl, phenyl, amino, hydroxy or trifluoromethyl group or a fluoro atom,
- 30 - R<sub>7</sub> represents a benzyl, phenyl, thiienyl or pyridyl group, which groups may be substituted on their aromatic ring with 1, 2, 3 or 4 substituents Y,

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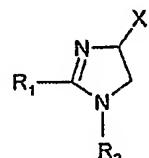
- wherein Y has the meaning as indicated above, which can be the same or different, or R<sub>7</sub> represents C<sub>1-8</sub> branched or linear alkyl, C<sub>3-8</sub> alkenyl, C<sub>3-10</sub> cycloalkyl, C<sub>5-10</sub> bicycloalkyl, C<sub>6-10</sub> tricycloalkyl or C<sub>5-8</sub> cycloalkenyl or R<sub>7</sub> represents naphtyl or R<sub>7</sub> represents a amino group or R<sub>7</sub> represents a C<sub>1-8</sub> dialkylamino group, a C<sub>1-8</sub> monoalkylamino group or a saturated or unsaturated, monocyclic or bicyclic, heterocyclic group having 4 to 10 ring atoms, which heterocyclic group contains 1 or 2 nitrogen atoms and which heterocyclic group may contain 1 heteroatom from the group (O, S) and which heterocyclic group may be substituted with a branched or linear C<sub>1-3</sub> alkyl, phenyl, hydroxy or trifluoromethyl group or a fluoro atom,
- 5           – R<sub>8</sub> represent a hydrogen atom or a methyl group,
- 10          – R<sub>9</sub> represents a hydrogen atom or a methyl, ethyl or methoxy group,
- 15          and tautomers, stereoisomers, prodrugs and salts thereof.
- 20          10. Use as claimed in claim 8 characterized in that said disorders are eating disorders, in particular obesity, juvenile obesity and drug induced obesity.
- 25          11. Use of a compound as claimed in claim 1 or claim 2 for the preparation of a pharmaceutical composition for the treatment of eating disorders, in particular obesity, juvenile obesity and drug induced obesity, characterized in that said pharmaceutical composition also contains at least one lipase inhibitor.
- 25          12. Use as claimed in claim 11, characterized in that said lipase inhibitor is orlistat or lipstatin.

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Abstract

The present invention relates to 1,2,4-tri-substituted imidazoline derivatives, to  
5 methods for the preparation of these compounds, to novel intermediates useful  
for the synthesis of said imidazoline derivatives, to methods for the preparation  
of these intermediates, to pharmaceutical compositions containing one or more  
of these imidazoline derivatives as active ingredient, as well as to the use of  
these pharmaceutical compositions for the treatment of psychiatric and  
10 neurological disorders. The compounds have the general formula (I)



(I)

wherein the symbols have the meanings given in the specification.

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